

CLAIMS

1. A data product that can be read by a computer or a map data processing apparatus, comprising:

map data including map-related information related to
5 a map, wherein:

the map-related information includes a compilation of a plurality of information elements of a single type;

the map-related information can be updated in units of the individual information elements at the map data
10 processing apparatus; and

the map-related information includes management information used to manage the map-related information, which is also updated when the map-related information is updated in units of the individual information elements.
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2. A data product according to claim 1, wherein:

roads are each indicated as a link string having one or more continuous links, with nodes representing points on the roads and each link representing a road portion
20 connecting two adjacent nodes; and

the information elements each correspond to information related to a link string.

3. A data product according to claim 2, wherein:

the information related to the link string includes node position information indicating a position of a node contained in the link string.

5 4. A data product according to claim 2 or claim 3, wherein:
the information related to the link string includes guidance information related to the link string.

5. A data product according to claim 3, wherein:
10 a plurality of levels each corresponding to one of a plurality of scaling factors of the map are defined;

a level corresponding to a scaling factor with a smaller value that renders the map as a wider area map is designated as a higher-order level;

15 a plurality of sets of map-related information are provided each in correspondence to one of the plurality of levels; and

the node position information included in the information related to the link string at a specific level
20 contains node position information of a node at the specific level and node position information on a node at a lower-order level corresponding to the node at the specific level.

6. A data product according to claim 1, wherein:

the map-related information is information related to a background used to display a road map; and

the information elements each constitute information related to a background object corresponding to a single display management unit.

7. A data product according to claim 6, wherein:
the information related to a background object corresponding to the single display management unit is information with regard to a single polygon, a single poly line or a single point related to the background.

8. A data product according to claim 6 or claim 7, wherein:
the information related to a background object corresponding to the single display management unit includes information indicating a drawing order; and

the map-related information assumes a structure that allows a rearrangement of a plurality of sets of information each related to a background object corresponding to the single display management unit which are grouped together, in correspondence to the drawing order when one of the plurality of sets of information each related to a background object corresponding to the single display management unit is updated.

9. A data product according to claim 1, wherein:
the information elements each correspond to
information related to a single name used to display a road
map.
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10. A data product according to claim 9, wherein:
the information related to a single name includes
information indicating a drawing order; and
the map-related information assumes a structure that
10 allows a rearrangement of a plurality of sets of information
each related to a single name which are grouped together, in
correspondence to the drawing order when one of the plurality
of sets of information related to a single name is updated.
- 15 11. A data product according to claim 1, wherein:
points on roads constitute nodes;
the map-related information is information related to
connections of the nodes used for route calculation; and
the information elements each correspond to
20 information managed in a single node unit.
12. A data product according to claim 11, wherein:
the information managed in the single node unit
includes information related to a subject node and
25 information related to a node adjacent to the subject node.

13. A data product according to claim 11 or 12, wherein:
a plurality of levels each corresponding to one of a
plurality of scaling factors of the map are defined;
5 a level corresponding to a scaling factor with a
smaller value that renders the map as a wider area map is
designated as a higher-order level;
a plurality of sets of map-related information are
provided each in correspondence to one of the plurality of
10 levels; and
node position information included in the information
managed in the single node unit at a specific level contains
node position information on a node at the specific level and
node position information on a node at a lower-order level
15 corresponding to the node at the specific level.

14. A data product according to claim 1, wherein:
points on roads constitute nodes;
the map-related information is information related to
20 connections of the nodes used for route calculation;
a plurality of levels each corresponding to one of a
plurality of scaling factors of the map are defined;
a level corresponding to a scaling factor with a
smaller value that renders the map as a wider area map is
25 designated as a higher-order level;

a plurality of sets of map-related information are provided each in correspondence to one of the plurality of levels; and

the information elements each constitute information
5 related to a node at a lower-order level corresponding to information related to a node at a specific level.

15. A data product according to claim 14, wherein:

node position information included in the information
10 related to the node contains position information on the node at a level having contained therein the node and position information on a node at a lower-order level corresponding to the node at the level having contained therein the node.

15 16. A data product that can be read by a computer or a map data processing apparatus, comprising:

map data including map-related information related to a map, wherein:

points on roads constitute nodes and road portions
20 extending between adjacent nodes are indicated as links;
information used to identify each of the nodes includes node position information related to latitude and longitude;
and

information used to identify each of the links includes
25 a combination of the node position information related to the

latitude and longitude of a node at one end of a target link and the node position information related to the latitude and longitude of a node at another end of the target link.

5 17. A data product according to claim 16, wherein:

the information used to identify each of the links specifies a direction of the target link in correspondence to an order with which the node position information related to the latitude and longitude of the node at the one end of
10 the target link and the node position information related to the latitude and longitude of the node at the other end of the target link are combined.

18. A data product according to claim 16 or claim 17,
15 wherein:

a plurality of levels each corresponding to one of a plurality of scaling factors of the map are defined;

a level corresponding to a scaling factor with a smaller value that renders the map as a wider area map is
20 designated as a higher-order level;

a plurality of sets of map-related information are provided in each in correspondence to one of the plurality of levels; and

the node position information at a specific level
25 contains node position information on a node at the specific

level and node position information on a node at a lower-order level corresponding to the node at the specific level.

19. A data product according to any of claims 1 through 18,
5 wherein:

the information elements each include identification information indicating whether information pertaining to a subject information element is valid or invalid.

10 20. A data product according to any of claims 1 through 19, wherein the data product is a recording medium having recorded therein the map data.

21. A map data processing apparatus, comprising:

15 a recording medium drive means having loaded therein a recording medium that is a data product according to claim 20;

an update data acquisition means for acquiring update data used to update map-related information in units of the
20 individual information units; and

a processing means for processing map data based upon the map data recorded in the recording medium and the update data acquired by the update data acquisition means.